EPSY 543 Advanced Analysis of Variance in Educational Research

Online Fall 2021 (Aug. 23 – Dec. 10)

Instructor:	Yue Yin, Ph.D., 765-430-3545 (mobile), yueyin@uic.edu
Course Materials:	Course materials are released Every Monday morning
Homework:	Weekly homework assignment (if any) is due every Monday midnight (23:59 PM). You can work on the course materials at any time and at any pace before the corresponding homework assignment is due.
Office Hour:	By Appointment. You can email me to make an appointment for a talk on the phone or zoom.

Reference Textbook*
Keppel, G., & Wickens, T. D. (2004). *Design and Analysis: A Researcher's Handbook* (4th ed.). Upper Saddle River, NJ: Prentice Hall.

You are highly encouraged to read an ANOVA textbook to get a deep and systematic understanding of the corresponding contents. In my teaching, I will follow the structure of this textbook and use some examples from the book, however, the homework assignments/exams are NOT directly from the textbook. Even though this book is a thorough and classical ANOVA book, some of my previous students felt this book was difficult to follow. Therefore, you are NOT required to purchase this book. If you have an earlier version of this book or a standard ANOVA book that covers similar topics, it will work too.

Alternative Textbook
Field, A. (2018). *Discovering statistics using IBM SPSS statistics (5th ed).* Los Angeles: Sage Publications (ISBN-10: 9781526419521, ISBN-13: 978-1526419521
Field's book is an intermediate-level statistics textbook, covering topics from introductory statistics, ANOVA, regression, and some more. It is reader-friendly, accessible, and fun, for those who are relatively new to statistics and want to learn the application of many kinds of statistical techniques quickly.
https://www.amazon.com/Discovering-Statistics-Using-IBM-SPSS/dp/1526419521/ref=sr_1_2?dchild=1&keywords=Field%2C+A.+%282013%29.+Discovering+statistics+using+IBM+SPSS+statistics+%284th+ed%29.&qid=1597554121&sr=8-2#customerReviews

Other Supplementary Textbooks*
American Psychological Association. (2020). *Publication Manual of the American Psychological Association* (7th ed.). American Psychological Association: Washington D.C.
Lomax, R. G. & Hahs-Vaughn, D. L. (2020). *Statistical Concepts*: *A Second Course* (5th ed.). Mahwah, NJ: Lawrence Erlbaum Associates.
Shavelson, R. J. (1996). *Statistical Reasoning for the Behavioral Sciences* (3rd ed.). Boston: Allyn & Bacon.

You don't need to purchase them. They are resources you can use to help you better understand the content.

Course Description

 This course is a continuation of the topics covered in a course of introductory statistics (e.g., EPSY 503). This course will focus on experimental design and analysis of variance (ANOVA) techniques, including single factor designs (One-way ANOVA), two-way factorial design (two-way ANOVA), repeated measures designs (Random-block ANOVA), mixed designs (Split-plot ANOVA), Analysis of Covariate (ANCOVA), and trend analysis. Also, assumption, effect size and mean comparison will be discussed for each topic. Besides, this course demonstrates how General Linear Modeling (GLM) reveals the underlying continuity between ANOVA and regression. Finally, the course introduces students to how to report statistics in APA-style write-up. SPSS will be used for most data analyses. Some hand computation will be needed from time to time to help students better understand concepts or to complete some analyses that cannot be done in SPSS.

Course Website

 The course website will be on Blackboard: https://uic.blackboard.com/. Please go there to study weekly course materials.

Required Technology

Internet Access

 Instruction and all course materials will be delivered online. Communication with the instructor will be conducted online as well. Students are responsible to maintain access to the internet throughout the semester to ensure smooth and complete delivery of course materials and timely communication with the instructor.

Software

- Internet browser capable of running Blackboard
- The Microsoft (MS) Office suite of software (including Word, PowerPoint, and Excel)
- SPSS: Information about it will be provided later on Blackboard.

Hardware

 You must have a computer that has audio capabilities (i.e., a working sound card and speakers or headphones) so that you can listen to the audio lectures.

Learning Materials

 Each **Monday**, the following learning materials will be available for you to view and/or download from the "Content" section in Blackboard. You are responsible for reviewing all of these materials thoroughly and completing the assigned activities. The table below lists the specific accessibility features and times when course materials will be made available to you.

Materials	Access	Release Time
Slide handout	PowerPoint Slides: can be downloaded and printed and also have scripts of the	1:00 AM

	lecture in the notes	
Audio lecture	Audio PowerPoint Presentation: can only be played online	1:00 AM
Data sets (as needed)	Can be downloaded	1:00 AM
Homework assignment (hw) [a]	Can be downloaded	1:00 AM
Answer key to previous module's homework assignment (hw solution)[b]	Can be downloaded	As early as 1:00 AM[c]
Other course materials, such as required or supplementary readings	Can be downloaded	1:00 AM

Note:
  a. The homework assignment is in the folder that contains the corresponding learning materials. e.g., homework for topic 2 is in the folder of topic 2.
  b. The answer key to the homework assignment is in the folder that contains the next topic. E.g., the solution to the hw for topic 1 is in the folder of topic 1. Please review the solution to the previous homework assignment before you start to learn a new topic.
  c. The answer key to the homework assignment is only available to those who have submitted their corresponding homework assignment. If you submit a homework assignment late, the corresponding homework answer key will not become available for you until you submit that homework assignment.

Suggested Learning Sequence
　　You are responsible for reviewing ALL of the course materials and completing the homework assignments and exams as assigned. To assist you with managing your time effectively, the following list of actions is a suggested sequence for using the course materials.
1. Read the assigned textbook chapter(s) and journal article(s) for the current module.
2. Print the lecture handout for the current module.
3. View and listen to the lecture for the current module, and carefully complete the exercises given during the lecture. **Important:** Each lecture presentation contains exercises and solutions to help you apply the content of the lecture. During the lecture, when I suggest that you pause the presentation and complete an exercise, you should do so to gain the maximum benefit from the exercise. Please do not skip the exercise or check the key beforehand. Otherwise, you will lose an opportunity to practice what you are learning and provide feedback to yourself: If you do well on the exercise, you may move forward; If you miss something, you may review the previous slides or ask me for help.
4. If a demonstration of data analysis is available, follow the slides and practice it on your computer.
5. Complete the homework assignment, and submit it on time.
6. When the solution is provided for the homework assignment: Correct your homework assignment by using the solutions, and review the course materials related to the items that you answered incorrectly or with uncertainty.
7. Due to its online nature, we cannot meet each other regularly. Therefore, you need to take initiative and contact me whenever you need help. Please contact me or discuss with your classmates on time if you have questions. DO NOT skip contents that you do not understand, and DO NOT allow confusion to build over time.

8. Some previous students found that talking to me on phone or via zoom is an efficient way to help them understand the contents that they have trouble with. Therefore, I encourage you to do so when needed.

Course Requirements

Homework Assignment (HW) -- 96 points

Purpose: In almost every module, you will be given a homework assignment to complete. The homework assignments serve three purposes: (1) to reinforce your learning, as the best way of learning is by doing; (2) to self-evaluate your ongoing learning, so that you can get timely feedback on how well you meet the instructional objectives and how you can improve learning; and (3) to give me feedback to improve my teaching. When you find anything confusing, please let me know as soon as possible, so that I can help you and/or modify the teaching materials timely. Doing and reviewing your homework assignments are critical for you to learn the course materials and prepare for the exams. **Based on my previous experience, those who completed their homework assignments carefully and timely tend to learn well, do very well on the exams, and gain good grades in the course. Plus, each homework assignment is worth 8 points. If you miss one homework assignment, it means that you need to get 8 more points on your exam to make it up, which is NOT easy.**

Due date/time: Unless specified otherwise, the weekly homework assignment is due at 11:59 PM (central US time) every Monday. You must upload your completed assignment on Blackboard *before* the due date/time.

Homework Submission: You are required to submit your completed homework assignments electronically on the Blackboard site by using the corresponding homework assignment link in the "Content" folder so that I can track everybody's work. Please do not send me your homework assignment via email. Even if it is a late submission, please still submit it via the homework submission link on Blackboard, so that your homework assignment will be recorded appropriately and you will be able to see the corresponding answer key.

Discussion and Group Work: While working on the homework assignments, you are welcome to discuss the assignment using the Blackboard discussion boards or through personal emails. However, you are not allowed to copy each other's work. **If evidence of copying is detected, all parties involved will receive a 0 for the particular homework assignment.**

Scoring: I will check your homework assignment for completion rather than correctness. (Each of you is responsible for reviewing the correctness of your homework assignment using the solution provided.) A homework assignment completed and submitted on time will earn full credit (8 points each) regardless of whether all of the problems are solved perfectly. If you don't know how to solve a problem, try your best and complete it as much as you can.

An assignment that is submitted on time but incomplete without trying will lose points proportionally. An assignment that is submitted late (i.e., after 11:59 PM central US time on the due day) will earn 0 points. I understand that everybody may have some emergency to deal with sometimes. Therefore, each of you will be allowed TWO opportunities to submit homework assignments up to one week late and still gain full credit for the homework assignment. When you need to use your late submission opportunities, please inform me as soon as you can. Again, when you submit your homework after the due time, please still submit your completed homework assignment on Blackboard.

You will be able to check your homework grade in "Tool→ My Grades" after the points have been awarded by the following week.

Answer Key (Feedback) and Self-Evaluation: I will provide a detailed solution file as a type of feedback for each homework assignment soon after you submit the completed homework assignment, which will show up in the folder of the following module. As it is a graduate-level course and we have frequent homework assignments, it is your responsibility to carefully compare your completed homework assignment with the answer key and correct any mistakes. However, if you have any questions about the homework assignments or you have trouble understanding the solution, please let me know or share your thoughts on the discussion board as soon as possible.

Sharing a Research Design -- 4 points

You are encouraged to discuss course contents and share course-related resources on the discussion board of the blackboard, so that students can build a learning community and learn from each other, just like what you do in a regular classroom! You are also encouraged to read the discussion board regularly in case any of the information is helpful for you. Based on my prior experience, many students ask great questions and made great comments. So I wish that you can fully use this wonderful resource.

You should design a study that is related to one of the ANOVA techniques covered in the course on the discussion board so that you can apply what you learned to a topic that you are interested in. Once you have shared it, you will gain 4 points. Other students are encouraged to ask questions and provide suggestions. This design task will be specified in one of the homework assignments.

Exams -- 200 points

There will be two exams during the course and each exam is worth 100 points. The midterm exam will focus on all the content up to and include Between-subjects design: Factorial ANOVA (2). The final exam will focus on the content from Within-subject Design: Repeated Measure (1), but will not exclude the basic information covered before the midterm.

You will take the midterm and final exams online. On the exam week, the exam will be available on Blackboard from 12:00 AM (early morning) Sunday morning to 11:59 PM (midnight) Wednesday on the dates listed on the course schedule. You can start to take the exam anytime during this 96-hour time window, but you will have to complete and submit your exam within 4 hours once you start the test. If you submit the exam late or fail to submit the exam at all, your score on the exam will be a 0. During the exam, you can log off and log in to the test if only you have not submitted the test. However, the 4-hour timer keeps running from the moment that you first log in to the test, even when you log off the test temporarily. Therefore, you may schedule 4 uninterrupted hours for the exam to fully use the time when needed. Please make sure that your computer, internet, software, and everything related to the test-taking are all working well before you start the test.

Both exams are open-book and open-notes, so you can use any course materials or even search online for information when taking the exams. However, **you must take the exams independently and should NOT consult any other people inside or outside the class. Also, for test security, you should NOT release the exam information to anybody. Otherwise, it is unfair to any honest students, including yourself. If any cheating behavior or exam releasing behavior is detected, anybody involved will be scored a 0 on the exam and reported to the department, college, or even university.**

After all of you have finished the exam, I will double-check computer scoring and send each student a feedback file with all the items you have missed. However, if your total score is lower than 70, such a file will not be sent because too many items and keys will be released. However, if you are interested in knowing what items you have missed, you are welcome to schedule a phone call with me, so that we can go over the items you missed.

To help students prepare for the online exam format, a sample exam will be available for students to practice before the midterm exam. However, students' scores on the sample exam will NOT be counted as part of your course score.

Grading

The final letter grade received for the course will be based on homework assignments and two exams. The relative contribution of each element is as follows: homework assignment (96 points), sharing a research design using ANOVA (4 points), midterm exam (100 points), and final exam (100 points). Your total course score = (homework assignment + one research design sharing + midterm score + final score)/3.

The letter grade will be assigned according to the following scale:

90 – 100%	A
80 – 89%	B
70 – 79%	C
60 – 69%	D
59% or below	F

For example, you turn in 10 homework assignments in time (8 * 10 = 80 points), use the one late submission opportunity and turn in one homework assignment one week late (8 points), and miss one homework assignment (0 points). You shared a research design (4 points). Also, you score 90 on the midterm exam and 95 on the final exam. You will get 30 points for the homework assignments. Your total score = (80 + 8 + 0 + 4 +90 + 95)/3 = 92.33. You will obtain an A for the course.

Communication with Instructor

If you ask clarification questions about the course contents (such as lectures, homework assignments, and solutions), please post your questions on the discussion board so that other students can participate in the discussion and benefit from your questions as well, just like in a regular classroom! I will also check the discussion board regularly and respond when needed. Even if you do not have questions about a topic, you are encouraged to read the discussion board regularly, share your ideas, contribute to the discussion, and/or learn from the discussions. If you have to email me your question and I find that your questions might be common or helpful for other students' learning, I will share your question anonymously and my answers on the discussion board, unless you ask me not to.

When you ask a personal question that is irrelevant to others, e.g., asking for a deadline extension for a homework assignment, you may email me at yueyin@uic.edu. When emailing me, please include "543" in the subject line, so that your email would be less likely to be missed.

When you post your question on the discussion board or email me, I will try my best to respond within 24 hours on weekdays. When you send me an email or post questions on the blackboard after 5:00 PM Chicago time on Friday, most likely I will respond on the following

Monday. If you have not received my reply within this planned time, please repost/resend your question, as I may have missed your earlier message somehow. I would appreciate your reminder.

When you post your research design, I will provide feedback on your research design within a week.

Academic Honesty

Some students are clearer than others on the norms of academic integrity, and in particular, what counts as plagiarism. A useful treatment of forms of academic dishonesty, including plagiarism, can be found at https://dos.uic.edu/community-standards/academic-integrity/. Please familiarize yourself with the forms of academic dishonesty as recognized by the University. If you have any questions about whether a particular activity constitutes academic dishonesty, you can ask me, or contact the UIC Office of the Dean of Students at 312-996-4857.

Technical Support

If you are having technical problems with the course, please send an e-mail with your name, the course rubric (i.e., EPSY543), and the nature of your problem to exedtech@uic.edu or call (312) 996-5948. A staff member will respond to inquiries Monday - Friday, 8 a.m. - 8 p.m. CST, and Saturday - Saturday, 11 a.m. - 3 p.m. CST.

Special Needs

UIC is committed to the full inclusion and participation of people with disabilities in all aspects of university life. If you face or anticipate disability-related barriers while at UIC, such as documented learning disabilities, vision, or hearing impairments, and emotional or physical disabilities, please connect with the Disability Resource Center (DRC) at drc.uic.edu, via email at drc@uic.edu, or call (312) 413-2183 to create a plan for reasonable accommodations. To receive accommodations, you will need to disclose the disability to the DRC, complete an interactive registration process with the DRC, and provide me with a Letter of Accommodation (LOA). Upon receipt of an LOA, I will gladly work with you and the DRC to implement approved accommodations.

Diversity and Inclusion

UIC values diversity and inclusion. Regardless of age, disability, ethnicity, race, gender, gender identity, sexual orientation, socioeconomic status, geographic background, religion, political ideology, language, or culture, we expect all members of this class to contribute to a respectful, welcoming, and inclusive environment for every other member of our class. If there are aspects of the instruction or design of this course that result in barriers to your inclusion, engagement, accurate assessment, or achievement, please notify me.

Resources

Many links to campus resources will be auto-populated for students on Blackboard and are also described in the UIC Student Handbook (https://dos.uic.edu/wp-content/uploads/sites/262/2019/01/FINAL-VERSION-2019.pdf). A comprehensive list of student resources is available on the Current Student Resources (https://today.uic.edu/resources/current-student-resources).

GSIG Initiative

The GSIG initiative is a program created by and for graduate students to increase opportunities for interdisciplinary collaboration and socialization so students build a strong research community for graduate school and beyond. GSIGs are special interest groups in which graduate students engage in an interdisciplinary research community around common interests. GSIGs meet monthly to discuss research and developments in topic areas, collaborate on ongoing projects, and support one another through the academic process with a shared goal to connect, commune, research, and expand knowledge. The initiative also hosts multiple signature events throughout the academic calendar that include: research workshops, graduate community conversations, and writing retreats.

- Graduate Research Opportunities at UIC: https://education.uic.edu/our-research/graduate-student-opportunities/
- GSIG: https://education.uic.edu/our-research/graduate-student-opportunities/gsigs/

Tentative Course Schedule and Topics*

Starting Day	Topic	Keppel	Homework Due
08/23 (M)	1. Review of Introductory Statistics and SPSS		
08/30 (M)	2. Experimental Research Design and Overview of ANOVA	KW 1	#1 (HW1 Due on 8/30)
09/06 (M)	3. Between-subjects design: One-way ANOVA	KW 2, 3	#2
09/13 (M)	4. Multiple Comparison Procedures	KW 4, 6	#3
09/20 (M)	5. Between-subjects design: Factorial ANOVA (1)	KW 10, 11	#4
09/27 (M)	6. Between-subjects design: Factorial ANOVA (2)	KW 12, 13	#5
10/04 (M)	7. Within-subject Design: Repeated Measure (1)	KW 16, 17	#6
10/10 (Sun) - 10/13 (W)	Midterm Exam	KW 18	
10/18 (M)	8. Within-subject Design: Repeated Measure (2)	KW 19, 20	#7
10/25 (M)	9. Mixed Design (Split-Plot) (1)		#8
11/01 (M)	10. Mixed Design (Split-Plot) (2)	KW 23	#9
11/08 (M)	11. Analysis of Covariance	KW 14, 15	#10
11/15 (M)	12. Trend Analysis	KW 5	#11
11/22 (M)	13. Report Statistical Results and review	APA	#12
11/28 (Sun) – 12/01 (W)	Final Exam		
12/06 (M)	14. Other ANOVA related topics (optional)		

* The course schedule and topics are tentative: (a) The actual amount of time allocated for each topic may vary in response to student feedback; (b) If we adhere to the schedule, we will cover all these topics. Otherwise, we may have to skip some.

The instructor sincerely welcomes everyone's input, suggestions, and feedback anytime during the course. Let's work together to have a fun and rewarding semester!